

A PROPOSED SEMINAR IN AGRICULTURAL MECHANICS
FOR INTERNATIONAL STUDENTS AT
KANSAS STATE UNIVERSITY

by

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A MASTER'S REPORT

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requirements for the degree

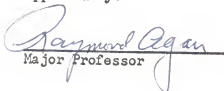
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INTRODUCTION

There has developed a pattern of growth in educational exchange which has reflected the intense interest abroad in educational opportunities in the United States, especially in the emerging countries. Such growth has caused the number of students, teachers, researchers, and doctors who have participated in programs of educational exchange between the United States and other nations to reach a new high in 1964.¹ The number of participating students in programs of educational exchange between Kansas and other nations reached a total of 1,488 including the 494 international students at Kansas State University.²

As programs of educational exchange have grown they naturally presented a variety of problems to those who sponsored and administered them--the selection of students, the development of programs fitted to their needs, orientation services, financial aid, and the like. Ralph W. Tyler, Chairman of the Education and World Affairs Study Committee on Foreign Student Affairs, said that:

On the whole, this growing involvement of United States colleges and universities in the education of foreign students has made a constructive contribution both at home and abroad, but it has also created problems which hinder the educational efforts and reduce the effectiveness of the international training programs.³

¹Open Doors, 1964, p.2.

²Ibid., p. 43.

³The Report of The EWA Study Committee of Foreign Student Affairs, The Foreign Student: Whom Shall We Welcome?, p. ix.

The need for this study became evident to the writer as Kansas State University experienced some of these problems referred to above in the various areas and departments that helped to administer the exchange programs. Clinton O. Jacobs, Assistant Professor, Agricultural Engineering, said in an interview with the writer that one of the problems that has caused concern among the educators in their department was how to help the international students gain a background in mechanical skills. It was his belief that extra time should be provided for the international students in the form of a special problem or seminar that would be useful to them in acquiring the mechanical skills they needed.

Statement of the Problem

The specific objective of this study was to develop guidelines for a seminar in Agricultural Mechanics for international students which would help them gain a background in mechanical skills.

Definition of Terms

For the purpose of this study words and terms were defined as follows:

A seminar. A proposed non-credit requirement of all international students enrolled in Agricultural Mechanics classes at Kansas State University.

Skills. This term referred to the physical dexterity, ability, methods, procedures, and techniques used with Agricultural Mechanics.

International students. These were the students from outside the United States who studied at Kansas State University and were enrolled in any of the Agricultural Mechanics classes.

Agricultural Mechanics classes. These were the Agricultural Engineering courses for students in Agriculture as listed in the 1964-1966 Kansas State University Bulletin General Catalog. They included Farm Mechanics, Farm Machinery Repair, Farm Power, Engineering in Agriculture, Farm Mechanics Methods, Farm Building Construction, Agricultural Engineering Applications, Dairy Mechanics, Advanced Farm Mechanics, Advanced Farm Power, Electricity in Agriculture, Irrigation Practices, and Drainage and Erosion Control.

Creative method of study. This referred to the use of data collected by personal interviews, library research, questionnaires, letters, and the results of a problem conducted in Agricultural Engineering to create a seminar for international students in Agricultural Mechanics.

A problem conducted in Agricultural Engineering. This was an educational problem worked out in co-operation with the Agricultural Engineering Department and consisted of having a graduate student spend extra time with the international students enrolled in Agricultural Mechanics classes to help them acquire mechanical skills.

Review of Selected Previous Investigations

There were no previous investigations found by the writer dealing with seminars designed to assist international students in courses

containing mechanical skills. It was assumed that no writing or research had been completed in this area. Interviews with administrative personnel and faculty members, who were aware of the problem and understood the position of the international students, revealed that little had been done to help the international students overcome their deficiencies in mechanical skills.

Dr. Arthur D. Weber, Vice President Emeritus, and Director of International Activities, said that while he had noticed the inadequacies in mechanical skills of the international students both in their home countries and in the United States, he did not know of any program or seminar that was being conducted at Kansas State University that was designed to help students acquire them.

Dewey McCormick, Assistant Professor, International Agricultural Programs, said that they have had seminars, special discussion groups and tours for all international students under the AID program for several years, but only in the animals field. The program provided instruction and experiences about the major agricultural animals, but contained nothing in Agricultural Mechanics.

Dr. Raymond J. Agan, Professor of Education, said that in 1964 Agricultural Education personnel began a summer placement program to help international students gain farm experience. Arrangements were made with Kansas farmers for the students to stay on their farms for three or four weeks during August. The farmers provided as many farming experiences as possible and gave the students an opportunity to live with an American family.

According to Dr. Agan, the results of this program were encouraging. Several international students drove tractors for the first time. Others performed the various jobs done on the farm like helping to haul wheat to the elevator and helping to handle the cattle on a dairy farm. The students commented about the opportunity they had to live with an American family and to see how an American farm was operated. The farmers were glad to have them in their homes and to learn about the countries from which they came.

Professor Henry Neely, Jr., Assistant to the Dean, Mechanical Engineering, said that they have no special classes or seminars to provide extra training for international students. They did attempt to help the students by placing them in classes that were more suited to their abilities. As they were able to handle the material of these classes, they were assigned to the more advanced classes.

Theodore Heermance, Assistant Dean of Students, and Foreign Student Advisor, said that he did not know of any program that was designed to help the international students gain proficiency in mechanical skills either at Kansas State University or elsewhere. He knew of a university that had developed a special program for training in English, but knew of no university or agency that had a special program in mechanics.

Clinton O. Jacobs, Assistant Professor, Agricultural Engineering, said that their department had arranged a problem in Agricultural Engineering in which a graduate student met with the international students, who were enrolled in the Agricultural Mechanics classes. During

this time they had the opportunity to gain experiences in some of the mechanical skills. He continued, that the program was arranged late in the enrollment period which prevented some of the international students from including it in their schedules, and that there were a few problems in finding the best time and place to meet. However, he thought the program was useful in providing an opportunity for the students to practice and learn the basic skills of Agricultural Mechanics. This problem in Agricultural Engineering has been a major source of the information for this study.

From the foregoing opinions stated by University personnel who worked with international students, it became the assumption of this study that while the Agricultural Education summer program was valuable in providing some much needed farm experience, it was limited in the following ways: (1) only those students who were enrolled in the Agricultural Education curriculum were placed on farms, (2) only those students whose program of study included summer-fall semesters were available for placement, (3) due to the farmer's work schedule there was little time available for systematic instruction in mechanics, and (4) because the program was held during the vacation period it did not contribute directly to the student's needs while he attended classes at Kansas State University.

It was further assumed that the assignment of Mechanical Engineering students to classes according to their ability was a help, but it did not give the additional time needed to practice mechanical skills.

It was further assumed that the Agricultural Engineering problem was the only one on the Kansas State University Campus that was designed to help the international students obtain the mechanical skills they needed.

RESEARCH PROCEDURE FOLLOWED

The creative method of research was used in this study. Procedures used to collect, analyze, and present data included the use of letters, interviews, documentary material, and the results of The Agricultural Engineering problem.

PRESENTATION OF DATA

The data of this study was presented in three sections, (1) the results of the interviews and letters, (2) the report of background differences, and (3) the findings of the Agricultural Engineering problem.

Results of Interviews and Letters

Interviews were limited to professors who taught Agricultural Mechanics classes in which international students were enrolled. Information obtained from the interviews revealed that of the six professors in this category all of them had observed that the international students were generally less proficient in mechanical skills than the United States students, and that they tended to be behind them in achievement and class standing. Three of the professors felt

that the lack of mechanical ability was the primary factor that caused the international students to be behind, while the other three felt it was a combination of all the differences in background. Paul N. Stevenson, Professor of Farm Mechanics, mentioned that on the Farm Mechanics Skill Survey,⁴ which he gave to each student enrolled in the Farm Mechanics class, the international students indicated that they could not perform many of the basic skills. This lack of mechanical proficiency was very noticeable in his classes. All of the professors indicated that providing additional time for international students to practice and study agricultural mechanics would be of help either directly or indirectly in their classes. Five were of the opinion that a seminar type program would help to overcome the problem. One of the professors, Dr. George Larson, Head of the Agricultural Engineering Department, said;

It would seem to me that the best solution, assuming that it is economically feasible, is to hold separate sections in certain courses so that it will be possible for the instructor to cover the material in the course at a rate that is compatible to a foreign student with special emphasis on giving him the opportunity to develop adequately certain skills needed.

Letters from personnel in other areas of the Kansas State University Campus tended to substantiate the concern of the professors of the Agricultural Engineering Department. Dr. Arthur D Weber, Vice President Emeritus, and Director of International Activities, wrote that:

⁴Department of Agricultural Engineering, Farm Mechanics Questionnaire and Skills Survey, pp. 1-5.

In observing the work of foreign students in their home countries, as well as in the United States, I have noticed their inadequacies in mechanical skills. These deficiencies reflect their cultural environment rather than inherent personal inadequacies. In many countries, an educated person does not have an opportunity to work with his hands.

Any formal academic arrangement whereby such skills may be acquired by the foreign student during his stay in the United States would, in my judgment, pay excellent dividends after he returns home. While I am not certain as to just how such instruction should be given, I should think that the seminar as proposed would be useful.

Dr. Vernon C. Larson, Director of International Agricultural Programs, said:

From our experience in working with many of the international students here at Kansas State we are cognizant that they are particularly weak in many of the fundamental skills in the broad field of agricultural mechanics which domestic students possess. A seminar that could be geared to assist these students achieve an approximate level of background information would have much merit.

The cultures from which these students from abroad have come are such that no built-in mechanism exists in their respective homelands for furnishing this learning experience. Many students here, when given opportunity to associate with a farmer in his shop or around his field equipment, make excellent progress in this respect. A whole seminar in agricultural mechanics geared toward the needs of international students would appear to be very worthwhile.

David J. Mugler, Assistant Director (Acting), Resident Instruction, College of Agriculture, said that three of the twenty-three international students in the College of Agriculture had taken a course in Agricultural Mechanics or were currently enrolled in similar courses. He continued to say:

In visiting with Dr. Duane Acher, Director of Resident Instruction in the College of Agriculture, I found that we would both be in favor of having an introductory course in Agricultural Mechanics if it were limited to International students. It is our opinion that this would allow these students to receive timely training

which could help them in future courses which they would take in Agricultural Mechanics.

The international students enrolled in the Agricultural Mechanics classes were also concerned with this problem since it affected them directly. They stated that they were aware that the American students were usually ahead of them in mechanical ability and class standing. They did not want special privileges, but only the opportunity to develop the skills they lacked. Victor Colon, graduate student from Puerto Rico, expressed it in this way, "We foreign students need this kind of help, because the American students are too much ahead of us in the using of equipment and working in the shop."

The above statements and references indicated that the international students lacked a background in mechanical skills and that a need existed to provide a program that would enable them to obtain mechanical ability.

Background Differences

In developing a seminar for international students in Agricultural Mechanics some consideration was given to the differences in the philosophical, cultural, physical, and lingual backgrounds between the international and American students. Theodore Heermance, Foreign Student Advisor, Kansas State University, said that due primarily to the Puritan influence in the history of the United States, it was considered honorable for educated people to do physical work. In some countries there was a loss of prestige if an educated person worked with his hands as he was expected to have servants do these tasks.

Dr. Filmer Northrop in his book The Meeting of East and West, wrote that easterners have often used a different method of approach to a learning or problem solving situation than have westerners. For example the Chinese cultural approach to knowledge has often been:

. . . through the use of linguistic symbolism, largely tentative, and often purely idiographic in character, to point toward a component in the nature of things which only immediate experience and continued contemplation can convey.⁵

This had differed from the western view which had used portions of experience to confirm knowledge which has tended to be expressed in logically developed, scientific and philosophical treatises.

With regard to the differences in lingual background, Dr. George Larson, Head of the Agricultural Engineering Department, said with reference to the international student, "It must be recognized that they are not too proficient with speaking and understanding our language." He continued to say:

The communication between the instructor and the student is not easy; and this, of course, is a definite barrier. This fact alone may contribute to a large degree the reason why the foreign student ranks academically in the lower 50% of the class.

The cultural shock was also faced by the international students as they came to the United States to study and according to Professor Heermance, Foreign Student Advisor, it has caused some serious repercussions.

Since it has been generally assumed that mechanical skills were a basic need of developing countries, it was planned that part of the

⁵Filmer Northrop, The Meeting of East and West, p. 316.

introduction of the proposed seminar would be used to explain the western point of view upon which almost all of the mechanics courses at Kansas State University were designed. It was not the aim of this seminar to make Americans of the international students, but only to help them gain experience in mechanical skills.

The Agricultural Engineering Problem

Professor Jacobs of the Agricultural Engineering Department suggested the outline to be followed in The Agricultural Engineering Problem which was designed to help international students gain mechanical experience. The problem was conducted during the fall semester of the 1964-1965 school year at Kansas State University. A graduate student, who had previous teaching experience overseas, was selected as the instructor. Four international students of the Farm Mechanics, Farm Building and Construction, and the Agricultural Engineering Applications classes participated in the program and met with the instructor on Wednesday afternoons from one to four in the Agricultural Engineering shop and class room. There were other international students who could not attend because of conflicts in their schedules. This group served as a comparison group.

The instructor of the problem co-ordinated the content of the problem course with the scheduled Agricultural Mechanics classes. The problem content was supplemented by including some other basic skills and farm experiences which were not included in the scheduled classes. As a part of The Agricultural Engineering Problem, a schedule of the

classes and skill topics, an outline of a class period, and a sample tool identification test were prepared. (See appendix of this report)

In evaluating the problem the only written tests given were the tool identification tests. The instructor recommended that other skill and subject matter tests be given during the proposed seminar. The faculty members who were teaching the scheduled Agricultural Mechanics courses during the time The Agricultural Engineering Problem was being conducted thought the instruction given in the problem was a help. Professor Stevenson said that the practice the international students had in sharpening tools and in using the shop equipment was of real benefit in the Farm Mechanics class. Professor Jacobs said the review of the terminology and the practice the international students had in using the carpentry tools and equipment was a help to them in the Farm Building Construction class.

The international students seemed to appreciate the time spent in the extra class. The instructor of the problem observed this from their alert questions, from the manner in which they worked and practiced skills, and from their comments. One student said, "We had a good chance to discuss the problems of Farm Mechanics which had been taught in the Farm Mechanics course, but missed due to language difficulties." Two students said that this was the first time they had ever cut a board with a hand saw. Another said that the extra time gave him, " . . . the opportunity to discuss problems, and do some shop work skills that are going to be of a great help to my studies in the future."

The instructor of the problem said that he was pleased with what was accomplished even though there was not enough time to do everything that should have been done. He recommended that the problem be made into a permanent program to continue as long as there were international students enrolled in the Agricultural Mechanics classes that needed help in acquiring mechanical skills.

THE PROPOSED SEMINAR

From information obtained from the University personnel surveyed, from other data collected, and from observations of the instructor of The Agricultural Engineering Problem, the following were developed as recommendations for administering future seminars for international students in Agricultural Mechanics:

An Outline of Suggestions for Conducting the Seminar

- I. Determine the skills to be taught.
 1. Administer the Farm Mechanics Skill Survey.
 2. Administer pre-tests in methods of procedure, subject matter content, and identification of tools and equipment.
 3. Consult with the professors regarding the current needs of the students.
 4. Avoid duplicating skills taught in scheduled classes, however, these skills may need to be practiced in the seminar.

II. Co-ordinate the seminar with scheduled Agricultural Mechanics classes.

1. Confer with the professors to determine the probable areas where practice and help in skills will be needed.
2. Arrange a time schedule so work noise of the seminar will not interfere with scheduled classes, and so the seminar students will not be using tools and equipment needed for the scheduled classes.

III. Select an instructor for the seminar.

1. Consider his ability to teach, his knowledge of the skills and subject matter of the Agricultural Mechanics classes, and his ability to work with the international students.
2. Select a graduate student to conduct the seminar as a graduate problem, hire a qualified person for the position, or assign advanced students of the Methods of Teaching Farm Mechanics class to conduct the seminar.

IV. Plan the seminar schedule.

1. Meet regularly once a week for a three hour period in the Agricultural Engineering Building.
2. Schedule tours and farm experiences on week-ends or during holidays.
3. Prepare a schedule of the dates the seminar will meet with the skills and subjects to be taught.

- V. Conduct the first meeting.
 - 1. Obtain and learn names and begin class roll.
 - 2. Explain the seminar procedures and the philosophical background from which the seminar will be conducted.
 - 3. Administer the Farm Mechanics Skill Survey.
- VI. Conduct subsequent meetings.
 - 1. Ask the students each meeting to express their questions and problems. The instructor may need to adjust his planned lesson to help answer and solve them.
 - 2. Divide the students into groups if necessary to facilitate practice of skills.
 - 3. Administer pre-tests before introducing new skills or subject matter.
 - 4. Provide a check sheet for the students to mark as they complete each skill or assignment.
- VII. Prepare the subject matter of skills to be presented in the seminar in outline form rather than as a lesson plan. (See appendix for an example)

A Procedure to Determine the Skills That Could Be Taught in the Seminar

- I. Prepare a composite list of all the skills and procedures generally included in Agricultural Mechanics.
- II. Present the composite list to the professors of the scheduled classes to determine which skills they teach.
- III. Select the skills that are not included in any of the

scheduled classes and present them to the international students. The skills they want will be considered for the seminar.

A composite list of Agricultural Mechanics skills and procedures was prepared during the course of this study from documents⁶ and text books.⁷ (See appendix)

A Plan for Obtaining Farm and Related Experiences

- I. Arrange with nearby farmers to help provide actual farm experiences. Have the international students drive tractors, adjust and maintain machinery in the field, and observe farm procedures.
- II. Encourage the international students to attend the National FFA Convention, leadership training schools, and related meetings and affairs.
- III. Plan visits and tours of different farms and places of interest that will be of help to develop a background in modern Agricultural Mechanics that may be of help to the inter-

⁶Carl F. Albrecht, A Comparison Of Skills Needed To Construct Four Different Farm Carpentry Projects, pp. 1-2; Pittha Bunnag, Proposed Curriculum For Technical Institutes In Vocational Agriculture For Thailand, pp. 9, 19-20; Bureau of Public Schools, Manila, Farm Mechanics Outlines and Course of Study, pp. 1-17; Kansas State University, Department of Agricultural Engineering, Farm Mechanics Questionnaire and Skills Survey, pp. 1-5.

⁷Mack M. Jones, Shopwork On The Farm, pp. 1-471.

national students when they return to their homes.

Suggestions for Evaluating the Seminar

- I. Use achievement, skill, and subject matter tests. Pre-tests followed later with re-tests could be done in areas of tool identification.
- II. Compare the grades made by the international students who attend the seminar with those who do not attend.
- III. Obtain the reactions and opinions of the professors of the scheduled classes in which international students are enrolled.
- IV. Obtain the opinions of the international students with regard to the seminar. The instructor should bear in mind that international students tend to be very polite and will often not state their true feelings for fear of offending the person with whom they are communicating.
- V. Consider some of the variables of evaluation which include previous training, cultural background, English communication and comprehension, and differences in natural ability and intelligence.

SUMMARY AND CONCLUSION

The purpose of this study was to develop a seminar in Agricultural Mechanics for international students. Information obtained during the course of this study revealed that at least fifteen administrative and faculty personnel have observed that in general the international students lack the background in mechanical skills that the United States students possess. According to the professors in the Agricultural Engineering Department, the lack of skills is one of the factors that has tended to prevent the international students from advancing as rapidly as the other students in their Agricultural Mechanics classes. In this study a seminar was designed to help the international students gain this needed background in mechanical skills.

The creative method of research was used in this study. Procedures used to collect, analyze, and present data included the use of letters, interviews, documentary material, and the observations made during the development of an Agricultural Engineering problem designed to help international students gain mechanical skills. Letters were obtained from administrative personnel who had the opportunity to observe international students at Kansas State University as well as in some of their own countries. Interviews were conducted mostly with faculty members who taught one or more of the Agricultural Mechanics classes or related subjects in which international students were enrolled. Documents were used to help determine the skills that should be included in the proposed seminar. Through a Problem in Agricultural

Engineering, observations were made, analyzed, and used as a basis for developing the proposed seminar of this study.

The findings of this study indicated the need for establishing a seminar for the purpose of solving the problems caused by lack of mechanical skills. It also indicated that the seminar should be a non-credit requirement for all international students enrolled in the Agricultural Mechanics classes, that it should meet once a week during a two to three hour period in the Agricultural Engineering Building, and that it should be co-ordinated with the scheduled mechanics classes. An instructor should be selected for the seminar who is familiar with the skills of the scheduled classes, who understands the problems of the international students and who is able to teach. The seminar should be flexible enough to attempt to meet the students' problems as they occur, and should be a continuous program as long as there is a sufficient number of international students who need help in acquiring mechanical skills.

During the study there was developed an outline of suggestions for conducting the seminar, a list of mechanical skills that could be taught, a plan for obtaining actual farm experiences and suggestions for evaluating the seminar.

It was the conclusion of this study that a seminar as proposed would be of great help in enabling the international students to gain a background in mechanical skills. The establishment of the seminar may depend upon finding personnel to administer the program.

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APPENDIX

Farm Mechanics Questionnaire

In order that we may determine more completely the needs of students enrolled in Agricultural Engineering Farm Mechanics Courses, we ask that you complete the information requested on this questionnaire with respect to your evaluation of farm mechanics jobs and skills.

Your Name _____ Town _____ County _____

No. of years associated with farming. _____

Type of farming with which concerned (major enterprise)

_____ General farming	_____ Livestock (hogs, sheep, and beef)
_____ Dairy	_____ Cash grain
_____ Poultry	_____ Fruit and/or truck

Name of high school attended _____

Did you complete course work in vocational agriculture? ____ Yes ____ No. If so, how many years were completed? _____

If shop work instruction was received during your high school attendance, check the following area of instruction which most nearly describes those taken:

_____ No shop work taken	_____ Concrete work
_____ Woodworking & finishing	_____ Blacksmithing and forging
_____ Machine shop	_____ Oxy-acetylene welding
_____ Farm Carpentry	_____ Electric arc welding
_____ Use of metal lathe	_____ Tool fitting
_____ Use of milling machine	_____ Building construction
_____ Sheet metal & soldering	_____ Farm electrification
_____ Plumbing	_____ Soil & water management
_____ Tractor & engine maintenance	_____ Farm water supply
_____ Farm sewage disposal	
_____ Farm machinery operation & maintenance	

Was there available on your farm a building or a section of a building for a home farm shop with work bench and tool storage space where you could perform shop work? ____ Yes ____ No.

Prior to attending college, in what type employment were you engaged? _____

Have you been a member of the Armed Forces of the U. S.? Yes ____, No ____. If yes, state branch and the type of work or affiliation with which you were connected.

What is your major objective in having enrolled in Agricultural Engineering Farm Mechanics course work? _____

FARM MECHANICS
SKILLS SURVEY

Based upon your experience, training, and need, place a check (✓) in one or more of the columns which most nearly describes your situation in regard to the following skills:

AREAS AND JOBS IN FARM MECHANICS	Confident can perform this job when neces- sary.	Have had formal instruc- tion in this job.	Need addi- tional prac- tice and instruction in this job.	Cannot perform this job.
<u>Farm Power & Machinery</u>				
1. Figure cost of machine operation				
2. Calibrate: (a) Seeding equipment				
(b) Spraying equipment				
(c) Fertilizer equip.				
3. Adjust farm machines:				
(a) Plow				
(b) Mower				
(c) Cultivator				
(d) Combine				
(e) Drill				
(f) Baler				
4. Figure pulley & sprocket size				
5. Select chain and belt drives				
6. Determine PTO drive relationships				
7. Service and adjust engine ignition system				
8. Service and adjust engine fuel system				
9. Grind engine valves				
10. Replace engine bearings.				
11. Repaint farm machines by spray method				
12. Perform pre-operation inspection on farm tractor				

	Confident can perform this job when neces- sary	Have had formal instruc- tion in this job	Need addi- tional prac- tice and in- struction in this job	Cannot perform this job
13. Operate tractor safely.				
<u>Farm Carpentry</u>				
1. Develop three plan view small bldg.				
2. Construct framework for pole bldg.				
3. Replace concrete foundation.				
4. Cut common rafter				
5. Lay out foundation for building.				
6. Determine mix of ingredients for specific standard concrete				
7. Lay: (a) wood shingles (b) composition shingles (c) metal roofing				
8. Open can paint				
9. Determine proper thinner for paint				
10. Clean & store paint brush				
11. Construct or rebuild farm fence corner posts				
12. Construct permanent fence on contour				
<u>Soil and Water Management</u>				
1. Use a farm level				
2. Keep accurate field notes.				
3. Lay out dam for farm pond				
4. Locate and construct waterways				
5. Develop terrace system				
6. Road contour & soil survey maps				
7. Pacing distance accurately				

	Confident can perform this job when neces- sary	Have had formal instruc- tion in this job	Need addi- tional prac- tice and in- struction in this Job	Cannot perform this job
<u>Rural Electrification</u>				
1. Figure electric power costs				
2. Determine wire capacity				
3. Service an electric motor				
4. Reverse electric motor rotation				
5. Change electric motor voltage				
6. Determine size & type of motor for given job				
7. Construct electric brooding equipment				
8. Check electric wiring circuits				
9. Properly install electric fence				
<u>Water Supply & Sewage Disposal</u>				
1. Select pipe & pipe fittings for a job				
2. Cut pipe threads				
3. Assemble pipe and pipe fittings				
4. Assemble plastic pipe				
5. Plan sanitary water system				
6. Plan & develop septic tank sewage disposal system for farmstead				
7. Flare and fit copper & alum. tubing				
<u>Farm Shop Work</u>				
1. Recondition keen edge hand tools (wood chisel, plane, iron, draw knife, butcher knife, etc.)				
2. Recondition hand wood saw				
3. Sharpen hand operated and table type circular saw blades				

	Confident can perform this job when neces- sary	Have had formal instruc- tion in this job	Need addi- tional prac- tice and in- struction in this job	Cannot perform this job
4. Sharpen chain type saw				
5. Sharpen metal cutting twist drill				
6. Sharpen mower knives, ensilage cutter or grinder knives				
7. Cut external and internal threads (tap and die work)				
8. Accurately measure and locate points on metal				
9. Set iron rivets cold				
10. Shape metal with hard file				
11. Cut key-ways, oil grooves, etc. with hand chisel				
12. Hand ream holes to accurate fit				
13. Pull or press bearings, shafts, etc.				
14. Cut metal with power driven hack saw				
15. Operate and turn metal with metal cutting lathe.				
16. Identify commonly used metals				
17. Select welding rods & materials				
18. Prepare metal parts for welding				
19. Operate acetylene gas generator				
20. Arc weld vertical or overhead position				
21. Weld steel using oxy-acetylene method				
22. Cut steel with cutting torch				
23. Bronze weld steel or cast iron				
24. Hardsurface tillage tools				

	Confident can perform this job when neces- sary	Have had formal instruc- tion in this job	Need addi- tional prac- tice and in- struction in this job	Cannot perform this job
25. Welding steel or cast iron with the electric arc welder				
26. Build up worn surfaces by welding				
27. Clean and prepare parts to solder				
28. Solder seams in metal parts				
29. Solder electrical connections				
30. Solder copper tubing and parts				
31. Develop patterns for sheet metal parts				
32. Calculate and form seams in sheet metal				
33. Build and maintain a coal forge fire				
34. Reforge and shape tool steel (chisels, punches, etc.)				
35. Forge and sharpen tillage tools (plow shares, sweeps, etc.)				
36. Heat-treat carbon steel parts; (temper a cold chisel)				

 Your Name

A SCHEDULE OF THE CLASSES AND THE SKILL TOPICS INCLUDED IN THE
AGRICULTURAL ENGINEERING PROBLEM:

September 23, 1964	Reviewed farm building construction terms, began identification of tools and parts of the equipment.
September 30, 1964	Discussed concrete bunk forms, and plans for laying out farmstead. Continued identification of tools and equipment.
October 7, 1964	Practiced using shop power tools--table saw, radial arm saw, jointer, drill press, etc.
October 14, 1964	Students attended the National FFA Convention at Kansas City, Missouri, and went on the Co-op farm tour.
October 21, 1964	Began sharpening hand tools--wood chisel, plane iron, screw driver.
October 28, 1964	Continued practice of using power tools, sharpened lathe bits.
November 4, 1964	Practiced figuring board feet. Finished sharpening hand tools.
November 11, 1964	Practiced joining wood with nails--toe nailing, surface nailing, setting finish nails. Pulled nails with hammer, and identified common types and sizes of nails.
November 18, 1964	Rope work lesson. Pre-test of section of tool

	identification.
November 25, 1964	Thanksgiving Holiday.
December 2, 1964	Discussed plans for animal shelter. Reviewed material for test.
December 9, 1964	Reviewed lesson on framing square. Discussed how to cut rafters and braces. Worked practice problems.
December 16, 1964	Reviewed identification of tools, figured length of rafters by using the three different methods.
December 22, 1964	Visited two nearby high school vocational agricultural shops.
December 23, 30, 1964	Christmas Vacation.
January 6, 1965	Thread cutting exercise. Retest of tool identification.
January 13, 1965	Pipe cutting and threading exercise. Practice with arc welder.

AN OUTLINE OF A CLASS PERIOD OF THE AGRICULTURAL ENGINEERING
PROBLEM APPEARS BELOW:

SETTING:

The fall semester at Kansas State University.

Date: September 23, 1964. Wednesday afternoon one to
three p.m.

PREPARATION:

Consultation with professors revealed that:

- (1) most of the international students were having
difficulty with terms and nomenclature in the
Farm Building Construction Class, and
- (2) they needed additional practice in sharpening tools
in the Farm Mechanics classes.

Informed of this need the instructor reviewed the material
and prepared to help the students.

THE CLASS:

Inquiry with the students revealed that they were having
difficulty understanding terms like "cup" (warping of a
board), "buck" (a dollar), pitch, run, span, rise per foot
of run, purlin, plate, etc. These and others terms were
explained and identified.

The instructor demonstrated how to sharpen a screw driver
with a grinding wheel and then had the students practice
this skill until the end of the period.

A SAMPLE TOOL IDENTIFICATION TEST GIVEN IN THE PROBLEM:

Item Number	Name of the Tool	Flash Card Number
1.	Expansion Bit	5
2.	Claw Hammer	12
3.	Ripping Claw Hammer	13
4.	Carpenter Level	17
5.	Saw Set	28
6.	Rip Saw	29
7.	Cross Cut Saw	30
8.	Compass Saw	31
9.	Jack Plane	35
10.	Standard Half Hatchet	36
11.	Wood Chisels	51
12.	Wrecking Bar	62
13.	Combination Square	72
14.	Try Square	73
15.	Framing Square	74
16.	Folding Rule	75
17.	Steel Tape	76
18.	Bit Brace	91
19.	Counter Sink	103
20.	Sliding Tee Bevel Square	104

The flash cards used to administer the test were published by
The Interstate Printers and Publishers, Inc., Danville, Illinois.

AN EXAMPLE OF A SUBJECT MATTER OUTLINE FORM

COLD-METAL WORK

KNOWLEDGE	PERFORMANCE
1. Nomenclature	1. How to cut inside and outside threads with tap and die.
2. Types and sizes of threads	
3. Procedure for cutting threads	
4. Types and sizes of rivets	4. How to set cold rivets.
5. Procedure for riveting	
6. Types and sizes of reamers	6. How to ream with a hand reamer.
7. Procedure for reaming	

A COMPOSITE LIST OF AGRICULTURAL MECHANICS SKILLS AND PROCEDURES:

This list was prepared in order to help determine which skills were taught in scheduled classes at Kansas State University, and which of them could be taught in the proposed seminar.

The list was to be submitted to the professor of each class who was to indicate by a number which skills were included in his classes. The numbers assigned to the classes are as follows:

- 1--Agriculture Engineering Applications
- 2--Dairy Mechanics
- 3--Electricity in Agriculture
- 4--Farm Building and Construction
- 5--Farm Machinery and Repair
- 6--Farm Mechanics
- 7--Farm Power
- 8--Methods of Teaching Farm Mechanics
- 9--Engineering in Agriculture
- 10--Farm Mechanics Methods
- 11--Advanced Farm Mechanics
- 12--Advanced Farm Power
- 13--Irrigation Practices
- 14--Drainage and Erosion Control

Place the class
number that in-
cludes the area
or skill

AREA AND SKILLS

PROVIDING AND EQUIPPING A FARM WORKSHOP

Selecting the Site	
Planning the Building	
Selecting Tools, Equipment, and Supplies	
Arranging the Interior and Storing Tools	
Storing Supplies and Materials	
Improving Existing Farm Workshops	
Maintaining a Farm Workshop	
Observing Safety Rules and Precautions	
Constructing Inexpensive Shop Equipment from	
Material on Hand	
Visiting a Well Planned Farm Workshop	
Lighting the Farm Workshop	
Heating, Ventilating, and Cooling the Farm Workshop	

SKETCHING AND DRAWING

Making Freehand Sketches	
Making Isometric and Oblique Sketches and Drawings	
Reading Working Drawings and Blueprints	
Lettering Sketches and Drawings	
Making Floor Plans for Buildings	
Making Out a Bill of Material	
Making Working Drawings To Scale	

FARM CARPENTRY

Selecting Kinds and Grades of Lumber	
Measuring and Marking Wood	
Sawing Wood	
Planning and Smoothing Wood	
Cutting with Wood Chisels	
Boring and Drilling Holes in Wood	
Fastening Wood	
Cutting Common Rafters	
Building Stairs and Steps	
Laying Out and Erecting a Small Building	
Identifying Common Handtools Used in Carpentry	
Identifying Types of Nails, Screws, and Hardware	
Learning Building Construction Terms	
Selecting and Using Home-Grown Lumber and Materials	
Selecting, Using and Adjusting Power Tools	
Hanging A Door	
Roofing Materials and Procedures	
Constructing Fence and Corner Posts	

PAINTING, FINISHING, AND WINDOW GLAZING

Selecting Paints	
Preparing Wood for Painting	
Preparing Metal Surfaces for Painting	
Applying Paint With Brush and Spray Gun	
Selecting, Cleaning, and Caring for Brushes	

Cutting Glass . . . . .	.....
Glazing a Glass Window . . . . .	.....
Replacing a Broken Window Glass . . . . .	.....
Storing and Handling Paints Safely . . . . .	.....
Opening a Can of Paint . . . . .	.....
Determining Proper Thinner for Paint . . . . .	.....

SHARPENING AND FITTING HAND TOOLS

Selecting and Using Grinders and Stones . . . . .	.....
Sharpening Knives, Machetes, or Bolos . . . . .	.....
Sharpening Axes and Hatchets . . . . .	.....
Sharpening Plane Bits and Wood Chisels . . . . .	.....
Sharpening Auger Bits . . . . .	.....
Sharpening Twist Drills . . . . .	.....
Sharpening Cold Chisels and Punches . . . . .	.....
Reconditioning Screw Drivers . . . . .	.....
Sharpening Scissors or Snips . . . . .	.....
Sharpening Hoes, Spades, and Shovels . . . . .	.....
Sharpening Saws . . . . .	.....
Replacing Handles in Tools . . . . .	.....
Cleaning and Caring for Tools . . . . .	.....
Sharpening Disc from Disc Harrow . . . . .	.....

ROPE WORK

Selecting Materials Used in Ropework	
Caring for Rope	
Finishing the Ends of Rope	
Tying the Ends of Rope Together	
Splicing Rope	
Making Rope Halters	
Using Block and Tackle	

CONCRETE WORK

Selecting Materials, Tools and Equipment	
Determining Proportions of Materials	
Building and Preparing Forms	
Reinforcing Concrete	
Mixing and Placing Concrete	
Finishing Concrete	
Making Watertight Concrete	
Laying Concrete Blocks	

COLD-METAL WORK

Identifying Different Kinds of Iron and Steel	
Laying Out and Marking Metal	
Cutting With a Cold Chisel	
Filing	
Hack Sawing	
Drilling Holes in Metal	

Bending Cold Metal	
Riveting	
Threading	
Reaming with Hand Reamer	

SOLDERING AND SHEET-METAL WORK

Preparing Parts for Soldering	
Soldering seams of Metal Parts	
Soldering Electrical Connections	
Soldering Copper Tubing and Parts	
Operating a Gasoline Blowtorch	
Cleaning, Tinning, and Using Soldering Irons	
Patching Large and Small Holes	
Laying Out Sheet-Metal Work	
Cutting Sheet-Metal	
Folding and Forming Joints	
Riveting Sheet Metal	
Fastening Sheet Metal with Self-Tapping Screws	

FORGING AND TEMPERING

Identifying and Selecting Forging Tools and Equipment	
Building and Maintaining Fire in the Forge	
Heating Irons in a Forge	
Cutting with the Hardy	
Bending, Straightening, Drawing, and Upsetting Iron	
Punching Holes in Hot Iron	

Annealing and Tempering Tool Steel

WELDING

Welding Principles of Operation

Identifying Welding Tools and Equipment

Selecting Welding Rods and Materials

Preparing Metal Parts for Welding

Operating the Acetylene Gas Generator

Welding with the Arc Welder

Welding with the Oxyacetylene Torch

Cutting Steel with the Cutting Torch

Brazing Steel or Cast Iron

Hardsurfacing Tillage Tools

Building-up Worn Surfaces by Welding

PIPEWORK AND SIMPLE PLUMBING

Identifying and Selecting Pipe Tools

Selecting Pipe and Pipe Fittings

Measuring and Cutting Pipe

Reaming and Threading Pipe

Assembling Pipe and Pipe Fittings

Repairing Leaky Valves and Faucets

Repairing Pumps

WATER SUPPLY

Selecting a Water System

Protecting Wells and Springs From Pollution

Determining Pipe Sizes, Tank Capacity, and Pressure

Principles of Force and Lift Pumps

SEWAGE DISPOSAL AND SANITATION

Identifying the Types of Sewage Disposals

Constructing the Septic Tank

Laying Sewage Drains

Storing and Disposing of Barnyard Manure

Improving Sanitary Conditions on the Farm

Disposing of Waste, Garbage, Dead Animals, etc.

Controlling Insects and Diseases

TRACTORS AND ENGINES

Identifying Different Kinds of Tractors

Operating a Tractor Safely

Maintaining a Tractor and Its Parts

Servicing and Adjusting the Ignition System

Servicing and Adjusting the Fuel System

Grinding the Valves

Replacing Worn Parts

Performing Pre-Operation Inspection of Tractor

FARM POWER AND MACHINERY

Figuring Pulley and Sprocket Size

Selecting Chain and Belt Drives

Determining PTO Drive Relationships

Figuring Cost of Machine Operation

Calibrating Seeding, Spraying, Fertilizer Equipment	
Adjusting Farm Machinery	
Maintaining and Repairing Farm Machinery	
Operating Farm Machinery in the Field	
Inspecting Recent Improvements in Machinery	

SOIL AND WATER CONSERVATION

Using Surveying Instruments	
Running a Level Line	
Laying Out Contour Strips	
Laying Out Drainage Ditches	
Grading and Leveling Land	
Constructing a Farm Pond	
Measuring Land	
Computing Cuts and Fills	
Identifying Types and Control of Erosion	
Planning for Cover Crops	
Determining Grades of Slopes	
Measuring Farm Water	
Maintaining Irrigation and Drainage Systems	

FARM ELECTRICITY

Meaning of Electrical Terms	
Reading an Electric Meter and Figuring Current Costs	
Identifying and Selecting Electrical Equipment	
Using Electricity Safely	

Applying Electricity to the Farm and Home	
Identifying and Selecting Types of Electric Motors	
Using Electric Motors On The Farm	
Maintaining Electric Motors	
Installing and Reversing Motors	
Making a Wiring Diagram for a Farm Building	
Making Electrical Installations	
Repairing and Maintaining Electrical Appliances	
Identifying and Selecting Electrical Generators	
Maintaining Electrical Generators	

FARM STRUCTURES

Designing Good Farm Buildings	
Selecting Building Materials, Types and Costs	
Selecting Types of Roofs and Materials	
Repairing and Maintaining Farm Structures	
Determining Building Requirements	
Arranging the Farmstead	
Constructing Footings and Foundations	

FARM EXPERIENCE

Driving a Tractor	
Observing and Participating in Farming Activities	
Changing a tire	

MACHINE POWERED SHOP TOOLS

Operating Table Saw Correctly and Safely	
Operating Radial Arm Saw	
Operating Portable Power Saw	
Changing Blades	
Making Cuts With Saws, Cut-off, Rip, Mitre, Dado	
Straightening a Crooked Board	
Operating Jointer	
Setting and Adjusting for Cut	
Joining to Size	
Making Chamfer and Bevel Cuts	
Straightening Crooked Boards, Correcting Taper	
Operating Drill Press	
Using Portable Electric Drill	
Operating Metal Lathe	
Operating Wood and Metal Band Saws	

INTERVIEW QUESTIONNAIRE

NAME _____

DEPARTMENT _____

WHAT AGRICULTURAL ENGINEERING COURSES FOR STUDENTS IN AGRICULTURE DO YOU
TEACH? _____

1. Do you have international students in your classes? ____ (Yes, No)
2. In your observation are international students (1) less proficient, (2) equally proficient, or (3) more proficient, in mechanical skills than the United States students? ____.
3. In your classes do international students tend to be (1) behind, (2) even with, or (3) ahead, of the United States students in grades and class standing? ____.
4. If the students tend to be behind the United States students, do you contribute this to a difference of (1) a practical mechanical background, (2) language comprehension, (3) socio-economic conditions, or (4) a combination of the above factors? ____.
5. Are any of the international students failing your courses? ____
6. Have any international students failed in the past three years? ____
7. Do you think that a seminar designed to give additional time for practice and study in agricultural mechanics would be (1) of some help, (2) of little help, or (3) of no help, in providing an opportunity for international students to gain proficiency in mechanical skills? ____.

Kansas State University

Manhattan, Kansas 66504

Vice-President Emeritus and Director
Office of International Activities
Holtz Hall

December 9, 1964

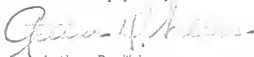
Mr. Wayne F. Doll
Department of Agricultural Education
University

Dear Mr. Doll:

In observing the work of foreign students in their home countries, as well as in the United States, I have noticed their inadequacies in mechanical skills. These deficiencies reflect their cultural environment rather than inherent personal inadequacies. In many countries, an educated person does not have an opportunity to work with his hands.

Any formal academic arrangement whereby such skills may be acquired by the foreign student during his stay in the United States would, in my judgment, pay excellent dividends after he returns home. While I am not certain as to just how such instruction should be given, I should think that the seminar as proposed would be useful.

Sincerely yours,



Arthur D. Weber
Vice President Emeritus
Director of International
Activities

Kansas State University

Manhattan, Kansas 66504

DEAN OF AGRICULTURE, WATERS HALL 114
Director, Agricultural Experiment Station, Waters Hall 113
Director, Resident Instruction, Waters Hall 117
Director, Kansas Extension Service, Umberger Hall 122

International Agricultural Programs
Waters 14

December 10, 1964

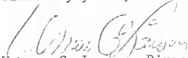
Mr. Wayne Doll
Department of Agricultural Education
G103b
University

Dear Mr. Doll:

From our experience in working with many of the international students here at Kansas State we are cognizant that they are particularly weak in many of the fundamental skills in the broad field of agricultural mechanics which domestic students possess. A seminar that could be geared to assist these students achieve an approximate level of background information would have much merit.

The cultures from which these students from abroad have come are such that no built-in mechanism exists in their respective homelands for furnishing this learning experience. Many students here, when given opportunity to associate with a farmer in his shop or around his field equipment, make excellent progress in this respect. A whole seminar in agricultural mechanics geared toward the needs of international students would appear to be very worthwhile.

Sincerely yours,



Vernon C. Larson, Director
International Agricultural Programs

VCL:rs

Kansas State University

Manhattan, Kansas 66504

DEAN OF AGRICULTURE, WATERS HALL 114
Director, Agricultural Experiment Station, Waters Hall 113
Director, Resident Instruction, Waters Hall 117
Director, Kansas Extension Service, Umberger Hall 122

December 14, 1964


Mr. Wayne Doll
Graduate Student
Agricultural Education
Holton 103
Kansas State University

Dear Wayne:

I was interested in learning of your study in proposing an introductory course in Agricultural Mechanics for International students here at Kansas State University. A quick review of the International students in the College of Agriculture revealed that one of the twenty-three had taken a course in Agricultural Mechanics and that two more were currently enrolled in similar courses.

In visiting with Dr. Duane Acker, Director of Resident Instruction in the College of Agriculture, I found that we would both be in favor of having an introductory course in Agricultural Mechanics if it was limited to International students. It is our opinion that this would allow these students to receive timely training which could help them in future courses which they would take in Agricultural Mechanics.

Sincerely yours,


David J. Magler
Assistant Director (Acting)
Resident Instruction

DJM:jmh

cc: Dean Duane Acker

Kansas State University

Manhattan, Kansas 66504

Department of Agricultural Engineering
Seaton Hall

December 19, 1964

Mr. Wayne Doll
Agricultural Education
Holton Hall

Dear Mr. Doll:

This letter concerns your inquiry regarding instruction for foreign students at Kansas State University--particularly in the area of Agricultural Mechanics.

It has been observed from an administrative point of view that in general most students from foreign countries do not possess the mechanical skills at the same level as our American students. There, probably at least two reasons for this. One of them is the kind of instruction they have had in their own country, and the other seems to be that it is below their dignity to get their "hands dirty", in other words, get in and work with their hands. Also, it must be recognized that they are not too proficient with speaking and understanding our language. The communication between the instructor and the student is not easy; and this, of course, is a definite barrier. This fact alone may contribute to a large degree the reason why the foreign student ranks academically in the lower 50% of the class. Occasionally a foreign student will rank high in the class but this, I would say, is an exception.

With regard to overcoming the above problems, it will require a lot of patience on the part of the instructor. It would seem to me that the best solution, assuming that it is economically feasible, is to hold separate sections in certain courses so that it will be possible for the instructor to cover the material in the course at a rate that is compatible to a foreign student with special emphasis on giving him the opportunity to develop adequately certain skills needed. More time and credit should be allowed for the instructor who has the responsibility of working with foreign students.

I note that you would like some comment regarding a proposed seminar for international students in Agricultural Mechanics. It is not clear to me what the objectives would be for the seminar. It is my personal feeling that what we need is a separate set of sections in our courses which are designed specifically for the foreign student. There is too much difference in background between the American and foreign student.

My other suggestion is that the University should require that these

Mr. Wayne Doll

-2-

December 19, 1964

students be more proficient with the English language, oral and written,
prior to coming to the United States.

Very truly yours,

A handwritten signature in cursive script, appearing to read "G. H. Larson".

G. H. Larson
Head of Department

A PROPOSED SEMINAR IN AGRICULTURE MECHANICS
FOR INTERNATIONAL STUDENTS AT
KANSAS STATE UNIVERSITY

by

WAYNE FREDERICK DOLL

B. S., Kansas State University, 1950

AN ABSTRACT OF A MASTER'S REPORT

submitted in partial fulfillment of the
requirements for the degree

MASTER OF SCIENCE

School of Education

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1965

The purpose of this study was to develop a seminar in Agricultural Mechanics for international students. Information obtained during the course of this study revealed that at least fifteen administrative and faculty personnel have observed that in general the international students lack the background in mechanical skills that the United States students possess. According to the professors in the Agricultural Engineering Department, the lack of skills is one of the factors that has tended to prevent the international students from advancing as rapidly as the other students in their Agricultural Mechanics classes. In this study a seminar was designed to help the international students gain this needed background in mechanical skills.

The creative method of research was used in this study. Procedures used to collect, analyze, and present data included the use of letters, interviews, documentary material, and the observations made during the development of an Agricultural Engineering problem designed to help international students gain mechanical skills. Letters were obtained from administrative personnel who had the opportunity to observe international students at Kansas State University as well as in some of their own countries. Interviews were conducted mostly with faculty members who taught one or more of the Agricultural Mechanics classes or related subjects in which international students were enrolled. Documents were used to help determine the skills that should be included in the proposed seminar. Through a Problem in Agricultural Engineering, observations were made, analyzed, and used as a basis for developing the proposed seminar of this study.

The findings of this study indicated the need for establishing a seminar for the purpose of solving the problems caused by lack of mechanical skills. It also indicated that the seminar should be a non-credit requirement for all international students enrolled in the Agricultural Mechanics classes, that it should meet once a week during a two to three hour period in the Agricultural Engineering Building, and that it should be co-ordinated with the scheduled mechanics classes. An instructor should be selected for the seminar who is familiar with the skills of the scheduled classes, who understands the problems of the international students and who is able to teach. The seminar should be flexible enough to attempt to meet the students' problems as they occur, and should be a continuous program as long as there is a sufficient number of international students who need help in acquiring mechanical skills.

During the study there was developed an outline of suggestions for conducting the seminar, a list of mechanical skills that could be taught, a plan for obtaining actual farm experiences and suggestions for evaluating the seminar.

It was the conclusion of this study that a seminar as proposed would be of great help in enabling the international students to gain a background in mechanical skills. The establishment of the seminar may depend upon finding personnel to administer the program.